of hostile criticism and alternative hypotheses furnished by anatomists and microscopists of great scientific repute. Prof. Osborn is, however, fully convinced of the ultimate triumph of the theory; and, indeed, goes so far as to state that, in his opinion, "the evidence in favour of it is so overwhelming that primitive trituberculy is no longer an hypothesis or a theory, but an established fact."

That a theory, although established on what appears to be a firm basis of fact, may require revision in certain details is a matter of everyday experience, and our author is fully prepared to admit such emendations in this particular case so soon as the necessity can be proved to be imperative. One of the points against which criticism has been concentrated is the author's view that the apex of the triangle in both the upper and the lower molars represents the single cone of the ancestral reptilian tooth. In the case of the lower teeth, embryological evidence coincides with Prof. Osborn's theoretical view; but as regards the upper molars the testimony of embryology points to the conclusion that, at least in many groups, the antero-external, in place of the internal, is the primitive element. The author meets this and other objections by the candid statement that the five great principles on which the theory was originally based "do not stand or fall together"; one or more may go, or have to be modified, without imperilling the hypothesis as a whole; and even if the cusps ultimately prove not to be strictly homologous with one another in different groups, "the homological nomenclature should be retained for convenience because it has found its way so largely into literature."

The homology and origin of the cusps are, however, by no means the sole object of attack on the part of critics. Among other objections, reference may be made to the multitubercular theory, according to which molars have tended to simplify rather than to grow more complex. This hypothesis is met by the author, and we think rightly, with a direct negative, and certain other objections receive equally summary treatment.

As regards the plan of the work, it is important to notice that the contents are in the main formed by separate papers on trituberculism, which have been arranged in chronological order, and, where necessary, brought up to date by intercalary notes. This plan has its advantages and disadvantages. Its advantages are that the history of the controversy is easy to follow, while the disadvantages are manifest in the shape of a considerable amount of repetition. We are also left in doubt at the end of the volume as to what the author's present views really are with regard to several points on which his theory has been challenged.

To do anything like justice to the work demands much more space than can be given to it in this notice. All that can be done is therefore to direct attention to its importance and interest, and at the same time to express the opinion that the author has succeeded in placing trituberculism on a much more secure and unassailable basis than it ever previously occupied.

R. L.

OUR BOOK SHELF.

Nature and Development of Plants. By C. C. Curtis. Pp. v+471. (New York: Henry Holt and Co., 1907.)

The author of this book has set himself a definite task, namely, to give an account of plant life, with special reference to that aspect which presents it as a working organism. Dr. Curtis is to be congratulated on the success with which he has achieved his object, for he has produced an excellent and readable book which may be confidently recommended for the use of junior classes in this country. Naturally, some of the actual examples may prove unfamiliar to the student, but the majority of the plants chosen for illustration are readily accessible to all.

The "nature of the plants" occupies the first part of the book, and it is this portion which strikes us as especially good. The second part is devoted to the development, meaning thereby the phylogenetic classification of the vegetable kingdom; and here again Dr. Curtis has, we think, contrived to sustain the interest in a branch of botany which, as treated in elementary works, is often intolerably dull. He has introduced a certain amount of advanced work in this part of the book, though with a judicious absence of unnecessary detail.

Perhaps a degree of emphasis, rather greater than is warranted by our knowledge, is laid on the relation between alternation of generations and chromosome reduction. The discussion also as to the meaning of unit characters and the method of their inheritance strikes us as too formal and dogmatic to be very useful. But these are small blemishes in a work where there is so much that merits praise.

The numerous and excellent illustrations form a distinct feature of the book, but we note two amongst them which might well be replaced. Fig. 43, and the text which accompanies it, represent a very diagrammatic and not very normal mode of secondary thickening, whilst Fig. 85 certainly ought to be redrawn. A seedling castor-oil plant is not the furry object there represented.

J. B. F.

The Diseases of Animals. By Nelson S. Mayo. Third edition. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1907.) Price 6*s.* 6*d.* net.

This work, which purports to be one of popular advice on the care and common ailments of farm animals, is written entirely from the American point of view, and deals with American methods principally, in most distinctly American orthography. It cannot be doubted that its usefulness to the British rural public, not less than the pleasure of reading it, are considerably lessened thereby. It is decidedly irritating to readers on this side of the Atlantic to see such abominations as "sulfur," "esophagus," "sulfate," "mold," and others of a similar kind. There is, nevertheless, a good deal of useful and practical information on the care of animals and farm stock which the farmer would do well to know, no matter in what part of the world he carries on his occupation. In fact, that portion of the book which deals with feeding, watering, exercise, and the hygienic care of domestic animals, both stock and pets, is in our opinion by far the most useful to the general reader. In this section dogs, cats, rabbits, hares, guinea-pigs, and poultry are dealt with, in addition to the farm animals proper.

The photographic illustrations of the animals themselves are good, but some of those representing morbid conditions are of little value, for example, that of tuberculosis of the lung (p. 380), which could give no assistance to the non-expert.

In a work of this kind it is doubtless difficult to

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deal satisfactorily with the pathological side, and it is a question whether such morbid processes as those of tumours would not be better omitted. In any case, we cannot agree with such statements as :—"True cancers are not common to animals," and, further, that cancers "are most frequent on the head and lower part of the legs." In the section on tuberculosis, the author is satisfied to leave the question of the identity or otherwise of human and bovine tubercle with Koch's original statement of non-communicability, ignoring all that has been done on the subject since that statement was made. Some other conditions, for example, rickets, are very inadequately described.

So far as this country is concerned, there is still room for a good up-to-date popular scientific work which will give the farmer such simple knowledge of the breeding, accidents, and diseases of his animals as will show him the occasion and the wisdom of consulting the skilled veterinarian. G. L.

Traité de Chimie analytique qualitative, suivi de Tables systématiques pour l'Analyse minérale. By Louis Duparc and Alfred Monnier. Second edition. Pp. viii+374. (Paris: Félix Alcan; Geneva: Librairie Kündig, 1908.)

THE first edition of this book on analytical chemistry appeared in 1900. In the present, second, edition there has been added a preliminary theoretical portion with the object of giving an insight into the reactions which take place during the analytical operations; this new portion gives an account of the atomic theory, the theory of solutions, and the theory of chemical equilibrium. Then follows the usual description of apparatus, reagents, and methods of manipulation. The main portion of the book is occupied by an enumeration of the reactions of the bases and acids, including the more common organic acids, and more briefly of the rare metals and alkaloids. In each case the reactions which take place are expressed by chemical equations. The book is intended to be a laboratory companion and work of reference not only for the student but also for the analytical chemist. Its value, however, for reference purposes is much lessened by the want of an index, though a full table of contents is given at the end of the volume.

Actualités scientifiques. By Max de Nansouty. Pp. 316. (Paris: Schleicher Frères, 1907.) Price 3.50 francs.

THIS volume is the fourth issue of an interesting and useful annual publication which on previous occasions we have commended to the notice of science students. Now that ability to read French is expected of science graduates in the University of London, books which provide means for a student to enlarge his vocabulary and at the same time to improve his knowledge of science should be very popular. The selection of subjects is very wide; *e.g.* articles are included on colour photography, the extraction of gold from the sea, spontaneous combustion, laughing, and artificial flowers.

(1) *California and the Californians.* Pp. 48. (2) *The Alps of King-Kern Divide.* Pp. 22. By President D. S. Jordan, Stanford University. (San Francisco: A. M. Robertson, 1907.)

THESE are two readable essays, the first of which appeared in the *Atlantic Monthly* ten years ago, while the other is reprinted from "Out West." The booklets should be read by visitors to California, and they may be commended also to the general reader, to whom the excellent illustrations will be an interesting feature.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Isothermal Layer of the Atmosphere.

THOSE who, like myself, have followed with interest, but at a distance, the attempts made during recent years to obtain direct information as to the meteorological conditions of the upper atmosphere, cannot but have felt a curiosity on some points which Mr. Dines's letter in NATURE of February 27 serves to deepen. To one who has had experience of the vagaries of self-recording instruments, the first question that suggests itself is what degree of reliance can be placed on the results obtained during *individual* ascents, whether of kites or of balloons. Supposing a temperature of −70° F. recorded, the total range of temperature between the ground and the "isothermal layer" will usually have exceeded 100° F.; thus a 3 per cent. or 4 per cent. error in the scale—an amount not infrequently exceeded in ordinary thermographs limited to ordinary surface temperatures—would suffice to give an uncertainty of 3° F. or 4° F., which seems all that Mr. Dines is prepared to allow. But, apart from mere scale errors, is it certain that there are no other sources of uncertainty in meteorograph records from kites or balloons even when these are sent up after nightfall?

Before attempting to explain such large differences as Mr. Dines mentions between the temperatures in the "isothermal layer," shown by meteorographs sent up on the same day from stations only a few hundred miles apart, one would like to know exactly what the evidence is that the temperatures recorded differ at most only 3° F. or 4° F. from the true ones. The following questions naturally suggest themselves :—

(1) Are the instruments tested over the whole range encountered in the atmosphere, both before and after an ascent?

(2) Has it been a frequent practice to send up two or more thermographs with the same balloon, or with separate balloons, but at the same station and at the same time, and if so, have they always given closely accordant results?

(3) Has it been established by actual trial that the different types of meteorographs, English and foreign, when sent up at the same time from the same station, give a satisfactory agreement?

Mr. Dines mentions a case when the temperatures found for the "isothermal layer" at three English stations on the same day varied from −42° F. to −74° F. An uncertainty of ±4° F. could account for only a quarter of this, but an uncertainty of ±8° F. might account for a half, and an uncertainty of ±16° F. for the whole. Now is there conclusive evidence that uncertainties of the order ±10° F. are quite out of the question?

March 3. CHARLES CHREE.

The Solidification of Helium.

IN the telegram from Prof. Kamerlingh Onnes announcing the solidification of helium, the statement is made that "the last evaporating parts show considerable vapour pressures as if liquid state is jumped over"—in other words, it apparently sublimes.

I have for a long time expected that this would be the case. When the boiling points and melting points of the non-valent elements are plotted against their atomic weights the curves nearly meet, the two points for argon being very near to one another. By a slight extrapolation they may be made to meet, and they then do so for an atomic weight much higher than that of helium. Now if an element corresponded to the meeting point its triple point would be given by the temperature at the join. Elements of lower atomic weight would sublime instead of melting. This is apparently the case for helium, and it is a moot point whether or not it will be found to be also so for neon. The uncertainty arises from the rapid drop in the curves in passing to the row of elements N, O, Fl, to which neon belongs. Each curve can be represented very nearly by a parabola. ALFRED W. PORTER.

University College, London, March 6.

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